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PATENT CLAIMS

1. A method of operating a cycler intended for peritoneal dialysis, comprising a pressure chamber provided with a first bag for enclosing a fresh fluid intended to be filled to a patient and a second bag for enclosing a spent fluid intended to be drained from a patient, said first and second bag being arranged at a weighing device for weighing the combined weight thereof, **characterized** by

draining said spent fluid into said second bag under the influence of an underpressure supervised by the weighing device; and

replenishing said first bag by pumping the replenishment fluid at a predetermined replenishment fluid flow rate during said draining step independent of the influence of the underpressure in the pressure chamber.

2. A method as claimed in claim 1, **characterized** by exposing both said first bag and said second bag for an underpressure in said pressure chamber during said draining step.

3. A method as claimed in claim 1 or 2, **characterized** by providing said replenishment fluid flow rate by a volumetric pump arranged at the inlet of said first bag.

4. A method as claimed in claim 1, 2 or 3, **characterized** by the fact that said replenishment flow rate is a constant flow rate.

5. A method as claimed in claim 4, **characterized** in that said replenishment of said first bag is performed at a constant flow rate until a predetermined replenishment volume has been introduced into said first bag.

6. A method as claimed in any of the preceding claims, **characterized** by controlling the draining step by means of said

weighing device, corrected for the replenishment of said first bag by said replenishment flow rate.

7. A method as claimed in claim 6, **characterized** by interrupting said draining step when a predetermined volume has been drained into the second bag.

8. A method as claimed in claim 6, **characterized** by interrupting said draining step when a predetermined time has elapsed from the start of the draining step.

9. A method as claimed in claim 6, **characterized** by interrupting said draining step when an inlet flow rate into said second bag is below a predetermined flow rate, said inlet flow rate being determined by said weighing device.

10. A method as claimed in any of the preceding claims, **characterized** in that said inlet flow rate is determined as a change of weight of the combined first bag and second bag.

11. A method as claimed in any of the preceding claims, in which said cycler is operated in four phases, in the following order:

a drain phase for draining spent dialysate from a patient connected to said second bag;

a fill phase for filling the patient with fresh fluid from said first bag;

an emptying phase for emptying the spent dialysate in said second bag to a waste receiver under the influence of an underpressure;

a replenishment phase for replenishing the first bag with fresh fluid;

characterised by the fact that the replenishment phase and the drain phase takes place at least partially simultaneously by pumping the replenish fluid at a predetermined flow rate independent of the influence of the underpressure in the pressure chamber.

12. A method as claimed in claim 11, **characterized** in that said replenishment phase is initiated during the emptying phase and in that the drain phase is initiated shortly after the termination of the emptying phase.

13. A method as claimed in claim 11 or 12, **characterized** in that:

said drain phase for draining spent dialysate from a patient connected to said second bag takes place under negative pressure in said pressure chamber;

said fill phase for filling the patient with fresh fluid from said first bag takes place under positive pressure in said pressure chamber;

said emptying phase for emptying the spent dialysate in said second bag to a waste receiver takes place under positive pressure in said pressure chamber;

said replenishment phase for replenishing the first bag with fresh fluid takes place during said emptying phase and/or said drain phase under either a positive or a negative pressure in said pressure chamber under the control of a positive displacement type pump.

14. A method as claimed in any one of claims 1 - 10, in which said cycler is operated in four phases in the following order:

a drain phase for draining spent dialysate from a patient connected to said second bag;

an emptying phase for emptying the spent dialysate in said second bag to a waste receiver;

a fill phase for filling the patient with fresh fluid from said first bag;

a replenishment phase for replenishing the first bag with fresh fluid;

characterised by the fact that the replenishment phase and the drain phase takes place at least partially simultaneously.

15. A method as claimed in claim 14, **characterized** in that said replenishment phase is initiated after the termination of the fill phase and continues during said drain phase and possibly also during said emptying phase.

16. A method as claimed in claim 14 or 15, **characterized** in that:

said drain phase for draining spent dialysate from a patient connected to said second bag takes place under negative pressure in said pressure chamber;

said emptying phase for emptying the spent dialysate in said second bag to a waste receiver takes place under positive pressure in said pressure chamber;

said fill phase for filling the patient with fresh fluid from said first bag takes place under positive pressure in said pressure chamber;

said replenishment phase for replenishing the first bag with fresh fluid takes place during said drain phase and/or said emptying phase under either a negative or a positive pressure in said pressure chamber under the control of a positive displacement type pump.

17. A method as claimed in any of the preceding claims, **characterized** in that during said replenishment phase, the first bag is exposed to a heating device for heating the fluid in the first bag to a temperature close to 37 degrees Celsius.

18. A method as claimed in claim 17, **characterized** in that the replenishment phase is terminated and the fill phase is initiated only when the temperature of the fluid in said first bag is close to 37 degrees Celsius.

19. A cycler intended for peritoneal dialysis, comprising a pressure chamber provided with a first bag for enclosing a fresh fluid intended to be filled to a patient and a second bag for enclosing a spent fluid intended to be drained from a patient, said first and second bag being arranged at a weighing device for weighing the combined weight thereof,

characterized by

a draining device for draining said spent fluid into said second bag under the influence of an underpressure supervised by the weighing device; and

a replenishment device for replenishing said first bag by pumping the replenishment fluid at a predetermined replenishment fluid flow rate during said draining step independent of the influence of the underpressure in the pressure chamber.

20. A cycler as claimed in claim 19, **characterized** in that said draining device is a pressure device for generating an underpressure in said pressure chamber comprising said first bag and said second bag during said draining step.

21. A cycler as claimed in claim 19 or 20, **characterized** in that said replenishment device is a volumetric pump arranged at the inlet of said first bag.

22. A cycler as claimed in claim 19, 20 or 21, **characterized** in that said volumetric pump is arranged to pump replenishment fluid into said first bag at a constant replenishment fluid flow rate.

23. A cycler as claimed in claim 22, **characterized** in that said volumetric pump is arranged to replenish said first bag at a constant replenishment fluid flow rate until a predetermined replenishment volume has been introduced into said first bag.

24. A cycler as claimed in any of claims 19 - 23, **characterized** in that said weighing device is arranged to control the draining step corrected for the replenishment of said first bag by said volumetric pump.

25. A cycler as claimed in claim 24, **characterized** in that the cycler is arranged to interrupt said draining step when a predetermined volume has been drained into the second bag.

26. A cycler as claimed in claim 24, **characterized** in that the cycler is arranged to interrupt said draining step when a predetermined time has elapsed from the start of the draining step.

27. A cycler as claimed in claim 24, **characterized** in that the cycler is arranged to interrupt said draining step when an

inlet flow rate into said second bag is below a predetermined flow rate, said inlet flow rate being determined by said weighing device.

28. A cycler as claimed in any of claims 19 - 27, **characterized** in that the cycler is arranged to determine said inlet flow rate as a change of weight of the combined first bag and second bag.

29. A cycler as claimed in any of claims 19 - 28, in which said cycler is operated in four phases, in the following order:

a drain phase for draining spent dialysate from a patient connected to said second bag;

a fill phase for filling the patient with fresh fluid from said first bag;

an emptying phase for emptying the spent dialysate in said second bag to a waste receiver;

a replenishment phase for replenishing the first bag with fresh fluid;

characterised by the fact that the replenishment phase and the drain phase takes place at least partially simultaneously.

30. A cycler as claimed in claim 29, **characterized** in that the cycler is arranged to initiate said replenishment phase during the emptying phase and to initiate the drain phase after the termination of the emptying phase.

31. A cycler as claimed in claim 29 or 30, **characterized** in that:

said drain phase for draining spent dialysate from a patient connected to said second bag takes place under negative pressure in said pressure chamber;

said fill phase for filling the patient with fresh fluid from said first bag takes place under positive pressure in said pressure chamber;

said emptying phase for emptying the spent dialysate in said second bag to a waste receiver takes place under positive pressure in said pressure chamber;

said replenishment phase for replenishing the first bag with replenishment fluid takes place during said emptying phase and/or said drain phase under either a positive or a negative pressure in said pressure chamber under the control of a positive displacement type pump.

32. A cycler as claimed in any one of claims 19 - 28, in which said cycler is operated in four phases in the following order:

a drain phase for draining spent dialysate from a patient connected to said second bag;

an emptying phase for emptying the spent dialysate in said second bag to a waste receiver;

a fill phase for filling the patient with fresh fluid from said first bag;

a replenishment phase for replenishing the first bag with fresh fluid;

characterised by the fact that the replenishment phase and the drain phase takes place at least partially simultaneously.

33. A cycler as claimed in claim 32, **characterized** in that the cycler is arranged to initiate said replenishment phase after the termination of the fill phase and said replenishment phase continues during said drain phase and possibly also during said emptying phase.

34. A cycler as claimed in claim 32 or 33, **characterized** in that:

said drain phase for draining spent dialysate from a patient connected to said second bag takes place under negative pressure in said pressure chamber;

said emptying phase for emptying the spent dialysate in said second bag to a waste receiver takes place under positive pressure in said pressure chamber;

said fill phase for filling the patient with fresh fluid from said first bag takes place under positive pressure in said pressure chamber;

said replenishment phase for replenishing the first bag with fresh fluid takes place during said drain phase and/or said emptying phase under either a negative or a positive pressure in said pressure chamber under the control of a positive displacement type pump.

35. A cycler as claimed in any of claims 19 - 34, **characterized** in that a heating device is arranged to expose the first bag to heat energy, during said replenishment phase, for heating the fluid in the first bag to a temperature close to 37 degrees Celsius.

36. A cycler as claimed in claim 34, **characterized** in that the cycler is arranged to terminate the replenishment phase and to initiate the fill phase only when the temperature of the fluid in said first bag is close to 37 degrees Celsius.

37. A cycler as claimed in any of claims 19 - 36, **characterized** in that the cycler comprises valves for controlling the fluid flow to and from the first bag and the second bag.

38. A cycler as claimed in claim 37, **characterised** by a first valve for controlling the fluid flow into said first bag from said replenishment device, a second valve for controlling the fluid flow out from said first bag to a patient line, a third valve for controlling the fluid flow into said second bag from said patient line and a fourth valve for controlling the fluid flow out from said second bag.

39. A cycler as claimed in claim 38, **characterised** in that said first valve is opened only when said second valve is closed and vice versa.

40. A cycler as claimed in claim 38 or 39, **characterised** in that said third valve is opened only when said second valve and said fourth valve is closed.

41. A cycler as claimed in claim 38 or 39, **characterised** in that said third valve is opened only when said fourth valve is closed and vice versa.

42. A cycler as claimed in claim 37, 38 or 39, **characterized** in that said pressure device is arranged to expose said pressure

chamber for a positive pressure when the second valve is opened and when the fourth valve is opened, and a negative pressure when the third valve is opened, and either a positive or negative pressure when the first valve is opened.

43. A cycler as claimed in any of claims 19 - 42, **characterized** in that said first bag and said second bag are combined into an integrated double bag.

44. A cycler as claimed in any of claims 19 - 43, **characterized** in that said replenishment device comprises a pump and a flow meter for measuring the replenishment fluid flow rate.

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